Downstream Migrant Chinook Production Evaluation in Cedar River and Bear Creek

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Science Division

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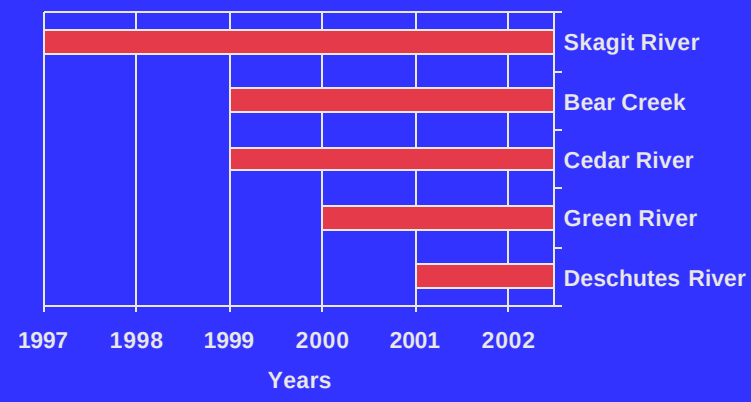
Funded by:
King County Wastewater Treatment Division
Seattle Public Utilities

Juvenile Chinook Production Monitoring



Location Map of the Cedar River and Bear Creek Trap Sites

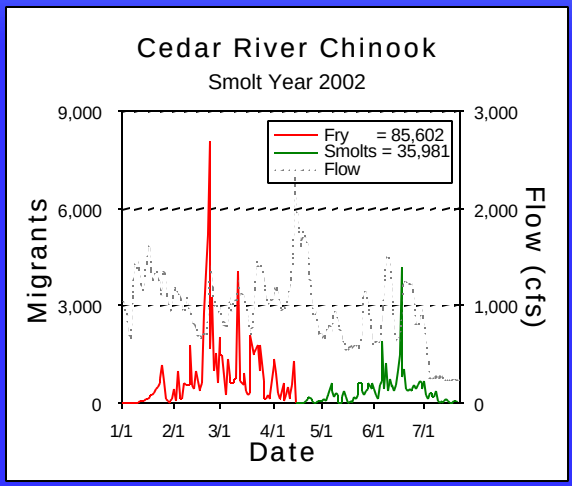
Cedar River

Big Bear Creek

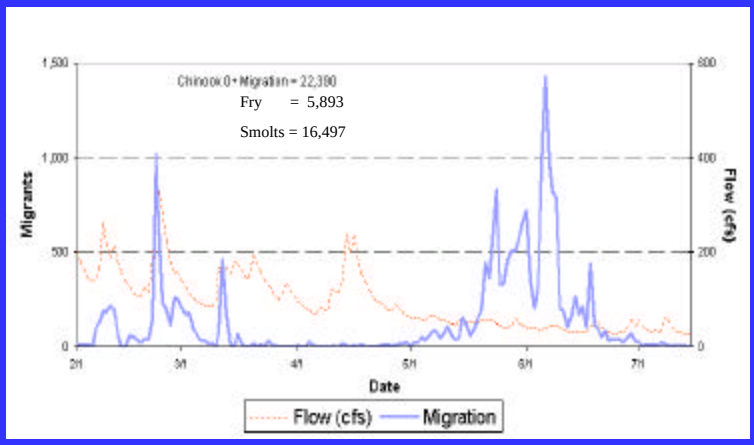
Migration Timing

Bi-modal migration timing

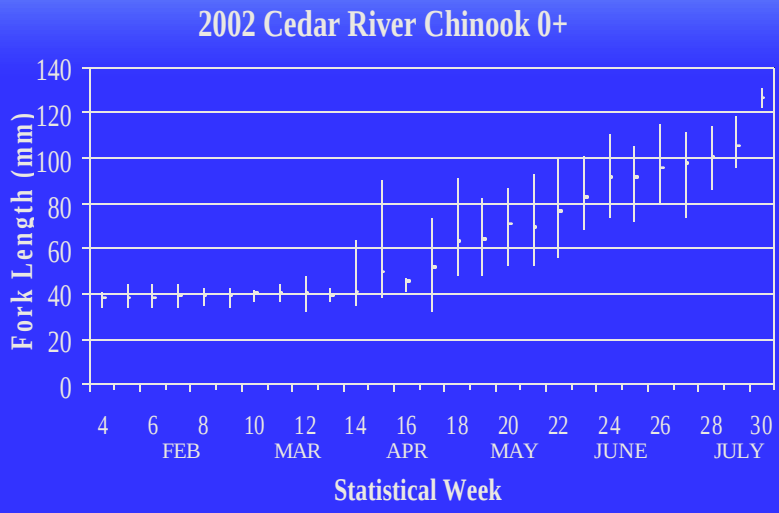
- "Fry" migration from January to mid-April
- "Smolt" migration from mid-April to July
- Different proportions between years



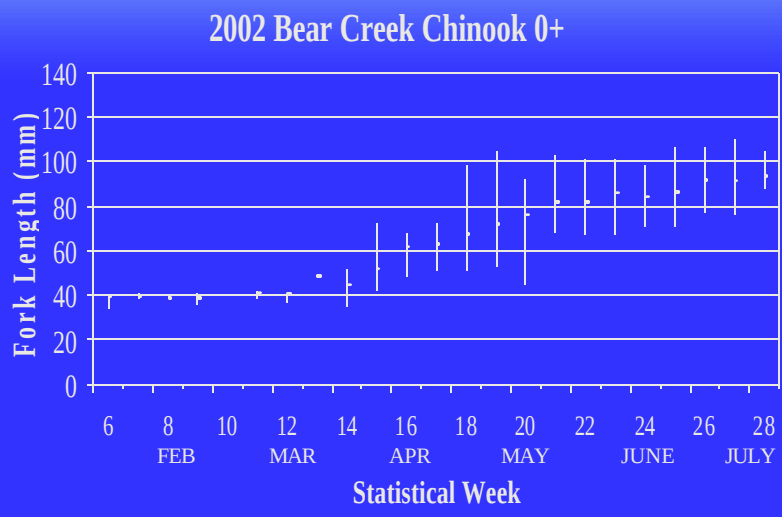
Bear Creek
Smolt Year 2002



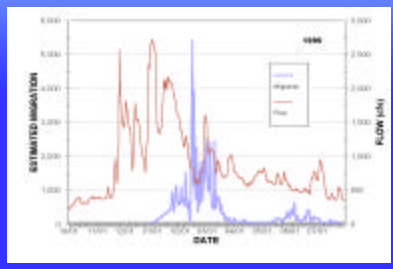
Chinook Size at Time

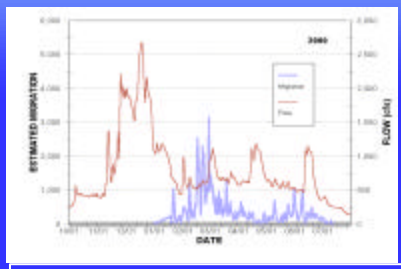


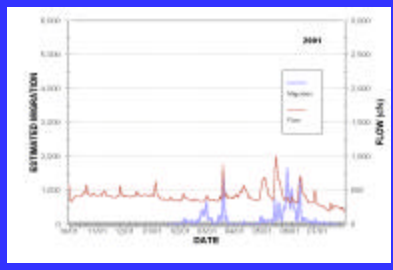
Chinook Size at Time



Cedar River Wild Chinook

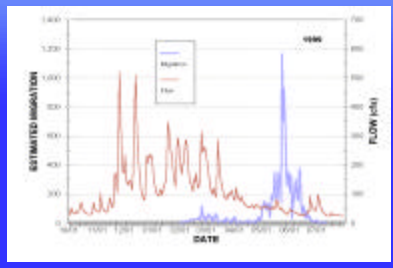


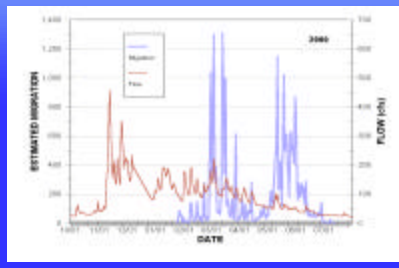


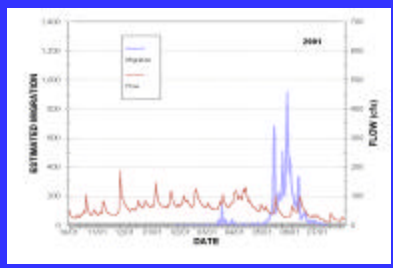


1999 – High flows/velocities push most of the production downstream as "fry". Low "smolt" production.
2000 – Moderate-high flows/velocities results in higher "smolt" production than observed in 1999.
2001 – Extreme low flows result in the highest "smolt" proportion measured. Low escapement (120) and predation contributed to the low number of total migrants.

Bear Creek Wild Chinook







1999 – Lower stream energy in Bear Creek results in high proportion of smolts even with high flow levels.
2000 – Good escapement (732) results in a higher proportion of fry being displaced downstream.
2001 – Low escapement and low flows providing an advantage to predators as well as high sockeye spawner abundance resulted in the lowest total production measured.

Cedar & Bear Chinook - Estimated production, timing, and survival to fry and smolts stages

CEDAR RIVER

Brood Year	Estimated Migration			Percent Migration		Est Female	Production/ Female		Survival Ratios		
	Fry	Smolts	Total	Fry	Smolts		Fry	Smolts	Fry	Smolts	Total
1998	68,121	12,811	80,932	84%	16%	173	394	74	8.8%	1.7%	10.4%
1999	46,500	18,223	64,723	72%	28%	180	258	101	5.8%	2.3%	8.0%
2000	9,427	20,200	29,627	32%	68%	53	178	381	4.0%	8.5%	12.4%
2001	85,881	35,981	121,862	70%	30%	395	217	91	4.8%	2.0%	6.9%

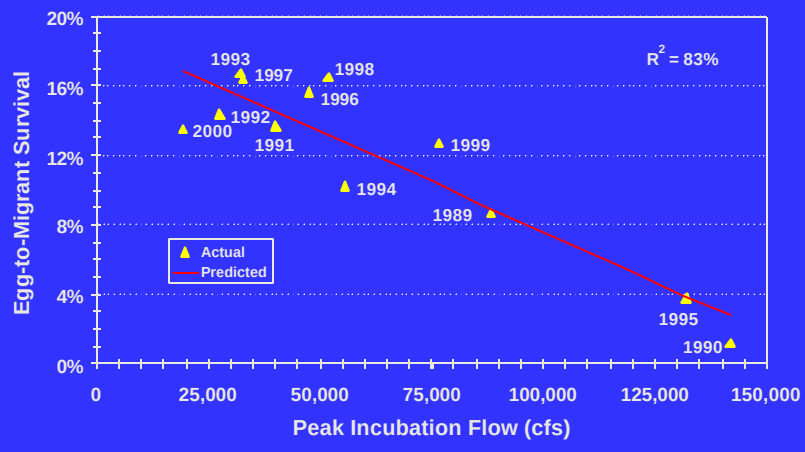
BEAR CREEK

Brood Year	Estimated Migration			Percent Migration		Est Female	Production/ Female		Survival Ratios		
	Fry	Smolts	Total	Fry	Smolts		Fry	Smolts	Fry	Smolts	Total
1998	1,866	13,282	15,148	12%	88%	159	12	84	0.3%	1.9%	2.1%
1999	14,116	18,104	32,220	44%	56%	293	48	62	1.1%	1.4%	2.4%
2000	541	10,616	11,157	5%	95%	133	4	80	0.1%	1.8%	1.9%
2001	5,893	16,497	22,390	26%	74%	276	21	60	0.5%	1.3%	1.8%

Incubation Success

- It's primarily a function of peak flow -

Skagit River Wild Zero-Age Chinook



Incubation Success

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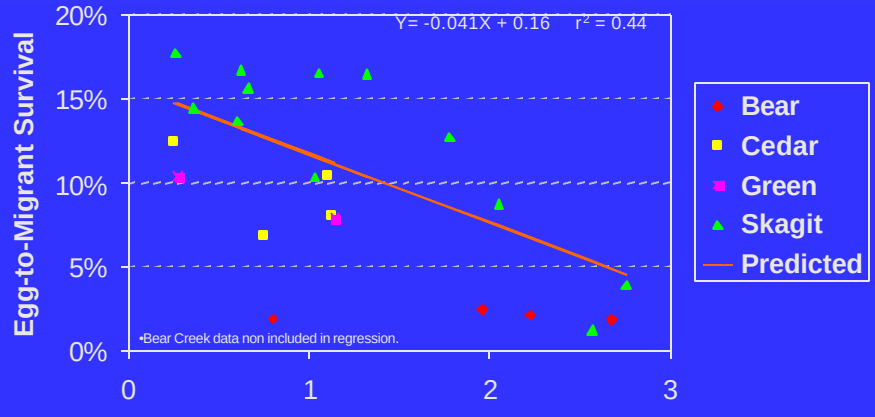
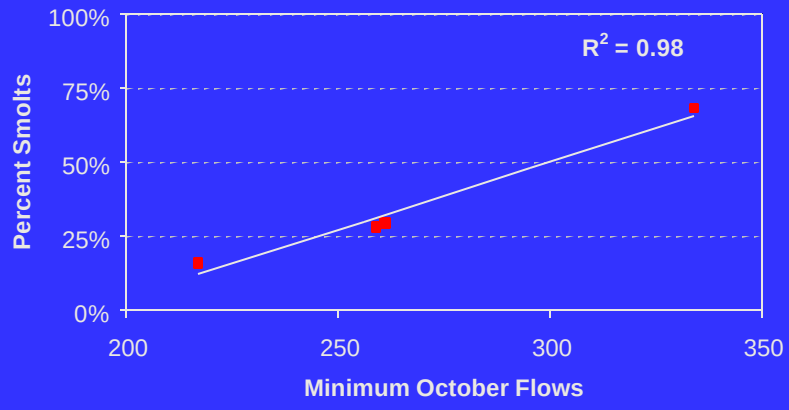


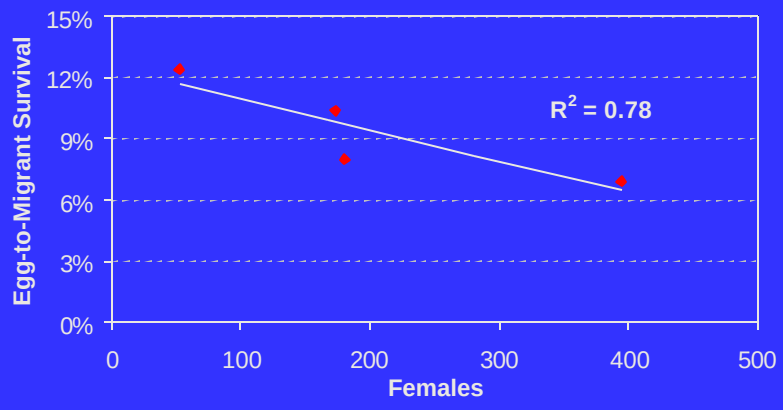
Proportion of Juvenile Chinook Migrating as Smolts Relative to Minimum Spawning Flows

Cedar River Brood Years 1998-2001



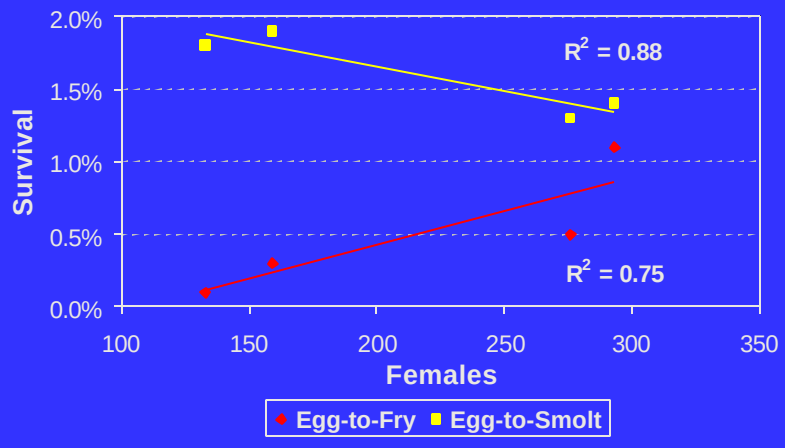
Egg-to-Migrant Survival Relative to Female Spawners

Cedar River Chinook Brood Years 1998-2001



Survival of Fry and Smolt Migrants Relative to Female Spawners

Bear Creek Chinook, Brood Years 1998-2001



PIT Tagging Studies

PIT Tagged Chinook Detection Rates
at the Ballard Locks